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Word Recognition Scores in Idiopathic Sudden Sensorineural Hearing Loss

Irina Linkov Middleton, AuD, CCC-A

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Dr. Irina Middleton is an audiologist with Jefferson Otolaryngology where she works with primarily the adult and geriatric populations. She holds a Doctorate of Audiology from the George Osborn College of Audiology, Salus University. Specialized interests include ototoxicity monitoring, tinnitus management and research.



Disclosures

- **Presenter Disclosure: Financial:** Irina Middleton is an employee of Jefferson Otolaryngology. She received an honorarium for this presentation. **Non-financial:** Irina Middleton has no relevant non-financial relationships to disclose.
- **Content Disclosure:** This learning event does not focus exclusively on any specific product or service.
- **Sponsor Disclosure:** There is no external sponsor for this course.

Introduction

- Clinical Audiologist with Jefferson Hearing and Balance Center since 2017
- Background:
 - Diagnostics (comprehensive audiologic evaluations)
 - Hearing aid evaluations, fittings, checks, verification
 - Tinnitus evaluations and management
 - Research involvement
 - Audiology Research and Ototoxicity Monitoring Program Coordinator

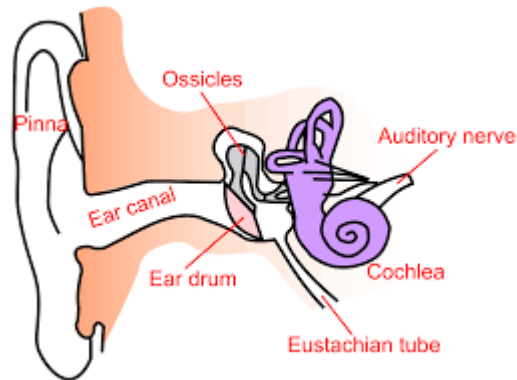
Learning Outcomes

After this course, participants will be able to:

- Discuss how to differentiate clinical presentations of sensorineural hearing loss and idiopathic sudden sensorineural hearing loss.
- Explain how to determine urgency for referral for medical intervention in patients presenting with sudden sensorineural hearing loss.
- Describe how to apply evidence based research to recovery anticipation in collaboration with otolaryngologists/otologists of patients seeking evaluation and treatment for idiopathic sudden sensorineural hearing loss.

HEARING LOSS (HL)

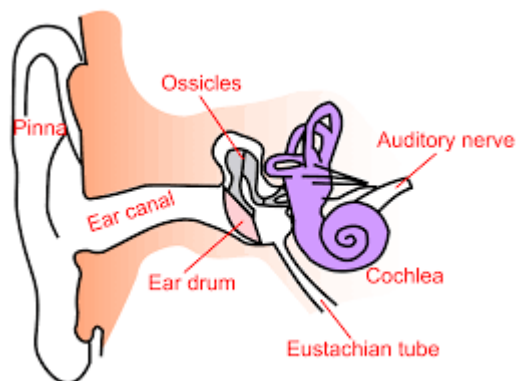
- Conductive
- Sensorineural
- Mixed



Sensorineural Hearing Loss (SNHL)

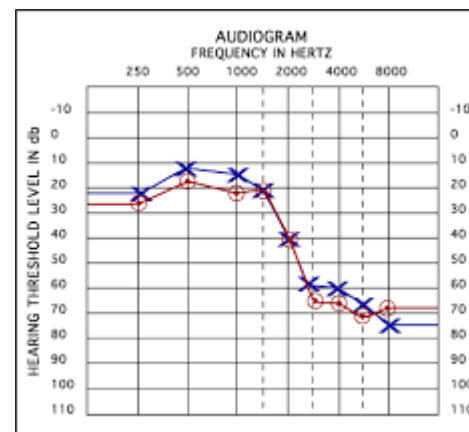
Anatomical Involvement

- **Cochlea**
 - Inner hair cell impairment
- **Auditory Nerve**



Clinical Presentation

- Gradual onset
- Bilateral hearing loss
- High frequency

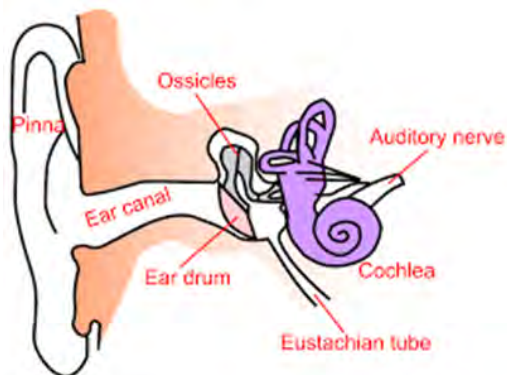


Sudden Sensorineural Hearing Loss (SSNHL)

Defined as hearing loss of 30 decibels (dB) or greater at three consecutive frequencies that occurs within 72 hours.

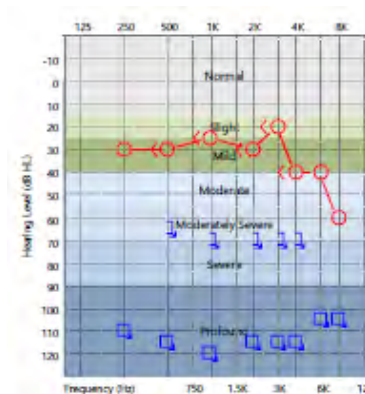
Anatomical Involvement

- **Cochlea**
 - Inner hair cell impairment
- **Auditory Nerve**



Clinical Presentation

- Rapid onset
- Unilateral hearing loss
- Associated tinnitus, aural fullness, dizziness



SSNHL

- Incidence
 - 5 to 27 cases per 100,000 annually in the U.S.
- Etiology
 - ~10% of individuals have a known cause
 - Idiopathic refers to cases which have an unknown cause
 - (ISSNHL)
- Prognosis
 - 32-65% of cases recovery spontaneously
 - Sooner treatment is initiated to timing of onset, the better the prognosis

Learning Objective 1



- Discuss how to differentiate clinical presentations of sensorineural hearing loss and idiopathic sudden sensorineural hearing loss.

American Academy of Otolaryngology - Head and Neck Surgery Foundations' (AAO-HNSF): Clinical Practice Guidelines for Management of SSNHL (updated 2019)

- Evidence based recommendations for evaluation and management of adults 18 and older in sudden hearing loss
- Below are some modified/updated key action statements from the Clinical Practice Guideline Development Manual, Third Edition
 - 1) Evaluation of hearing loss via audiologic testing to distinguish true nature of hearing loss to be conducted as soon as possible (within fourteen days of symptom onset)
 - 2) Patient education of SSNHL including history of condition, benefits and risks of medical intervention, and limitations of existing evidence regarding efficacy
 - 3) Provide information/counseling on audiologic rehabilitative options for patients with confirmed SSNHL and residual hearing loss and/or tinnitus

AAO-HNSF: Clinical Practice Guidelines for Management of SSNHL Con't.

Timing of Intervention

- SSNHL is considered to be a medical emergency. As such, evaluation and treatment should be immediate
- Audiometry should be obtained as soon as possible (within 14 days of symptoms onset)

Mode of intervention

- Corticosteroid therapy (initial therapy)– within 2 weeks of onset
- Combination of steroid therapy and hyperbaric oxygen therapy – within 1 month of onset
- Offer/refer to clinician who can offer intratympanic steroid therapy when patients have incomplete recovery from SSNHL 2-6 weeks after onset of symptoms

Learning Objective 2



- Explain how to determine urgency for referral for medical intervention in patients presenting

Current Literature re: WRS and ISSNHL

- Title:
 - “Improvement in word recognition following treatment failure for sudden sensorineural hearing loss.”
- Authors:
 - Taha A. Jan, Elliott D. Kozin, Vivek V. Kanumuri, Rosh K. Sethi, David H. Jung
- Target population within this study
 - Patients with confirmed SSNHL with improved WRS despite stable PTA
- Study type:
 - Retrospective chart review at tertiary otolaryngology practice
- Conclusions:
 - 13/113 participants were identified with improved WRS despite stable PTA

Research Study

- Word Recognition Improvement in Patients with Idiopathic Sudden Sensorineural Hearing Loss
- Drs. Alexandra Costlow, Molly Wolfson, Zach Urdang, Midori Wakabayashi and Irina Linkov Middleton

Word Recognition Improvement in Patients with Idiopathic Sudden Sensorineural Hearing Loss

- The aim of this study was to evaluate word recognition scores (WRS) in patients undergoing steroid treatment for idiopathic sudden sensorineural hearing loss (ISSNHL) to determine if WRS improves if treatment is initiated beyond the recommendations of clinical guidelines.
 - A retrospective chart review was conducted in patients previously treated for primary complaint of ISSNHL within five ENT practice locations from 2016-2019.
 - All patients seeking treatment for ISSNHL were seen in a hospital/medical setting by otolaryngologists/otologists.
- 

INCLUSION CRITERIA	EXCLUSION CRITERIA
• >17 years of age • ICD-10 code: H90.5, H90.3 (diagnosed asymmetric or symmetric sensorineural hearing loss) • ICD-10 code: H91.2xx (H91.21, H91.22: Confirmed sudden hearing loss) • Classifying criteria: hearing loss >30 dB HL at three consecutive frequencies within three days of onset of symptoms • Years: 2016-2019 • Diagnosed with ISSHL. Idiopathic means there is no identifiable medical cause for hearing loss. • No prior treatment for sudden hearing loss at alternate medical practice.	• Hearing loss dx: conductive, mixed • Patient seen for second opinion within Jefferson enterprise for sudden hearing loss. • Hx of sudden hearing loss in same affected ear • Cerumen Impaction • Known hx of tinnitus, otologic symptoms • Confirmed diagnosis of Meniere's Disease • Confirmed diagnosis of Labyrinthitis • Confirmed diagnosis of COVID-19 • Confirmed diagnosis of Perilymph Fistula (PLF) • Audiologic evaluation conducted externally • Confirmed cancer diagnosis with intended or previous treatment of chemotherapeutic agents with or without radiation • Confirmed diagnosis of transverse and longitudinal temporal bone fracture • Confirmed diagnosis of retrocochlear pathology through imaging (MRI) • Confirmed diagnosis of autoimmune and vascular pathologies. • Acoustic trauma, i.e., cochlear damage, tympanic membrane perforation, ossicular chain disarticulation

Of the 695 participants, 160 met the inclusion criteria and were analyzed based on timing of onset to service date, age, gender, associated ear, associated symptoms as well as recovery in pure tone average (PTA) and improvement in word recognition scores (WRS).

- Included participants were divided into four groups based on timing (days) of onset of symptoms.
- Groups were divided utilizing existing treatment guideline recommendations set by AAO-HNSF

GROUPS	DAYS FROM ONSET
1	0-14
2	15-28
3	28-42
4	>42

Data collection

Pre and post treatment

- Pure tone average
- WRS score
- Frequencies effected

Additional Information

- Gender
- Age
- Recovery detail
 - PTA recovery
 - No recovery
- Associated symptoms
- Mode of treatment
 - Oral steroids
 - Intratympanic injection
 - Combination of the above

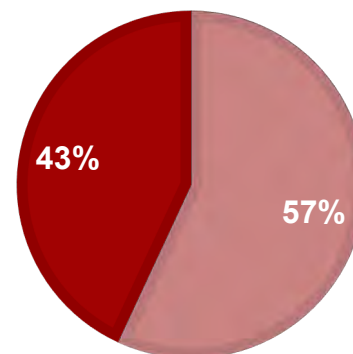
Gender

All	N=160	cOnset2Service = O2S≤14 N=79 (49.4%)	cOnset2Service = 14<O2S≤28 N=33 (20.6%)	cOnset2Service = 28<O2S≤42 N=26 (16.2%)	cOnset2Service = 42<O2S N=22 (13.8%)	Significance (by cOnset2Service)
Sex: n (%)						
Female	91 (56.9%)	48 (60.8%)	14 (42.4%)	14 (53.8%)	15 (68.2%)	0.219 Fisher's Exact
Male	69 (43.1%)	31 (39.2%)	19 (57.6%)	12 (46.2%)	7 (31.8%)	

Gender held no statistical significance on anticipation of recovery of symptoms.

GENDER

■ Female ■ Male

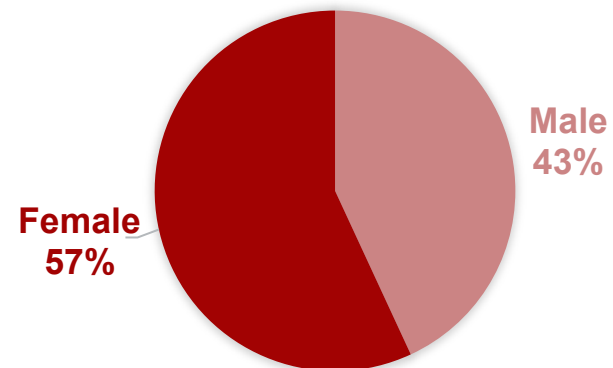


Age

All	N=160	cOnset2Service = 02S≤14 N=79 (49.4%)	cOnset2Service = 14<02S≤28 N=33 (20.6%)	cOnset2Service = 28<02S≤42 N=26 (16.2%)	cOnset2Service = 42<02S N=22 (13.8%)	Significance (by cOnset2Service)
Age_Service (years).						
mean±sd	59.0±15.8	58.1±16.0	61.4±15.6	55.2±16.7	63.2±13.3	0.256
median±IQR	60.5±24.6	58.5±22.3	61.4±18.3	55.2±27.8	66.5±19.0	ANOVA
Skewness; Shapiro-Wilk	-0.2 ✓	-0.0 ✓	-0.5 ✓	-0.2 ✓	-0.4 ✓	
Range	22.1~99.2	24.8~99.2	23.8~88.5	22.1~79.4	36.9~84.9	

AGE @ ONSET

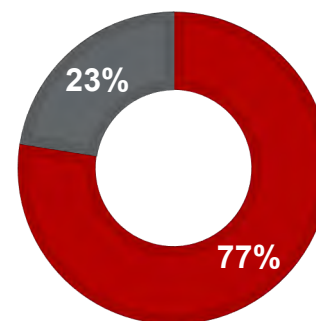
Age held no statistical significance on anticipation of recovery of symptoms.



Recovery Detail, PTA or No Recovery

- Of 160 participants, 36 (~23%) experienced PTA recovery.
- PTA recovery is defined as “achieving at least 25 dB improvement in pure tone average or a return to pre-loss values after treatment.”
- However, improvement within WRS was identified in all participants.

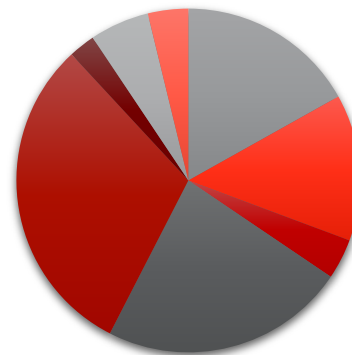
RECOVERY DETAIL
■ No Recovery ■ PTA Recovery



Associated Symptoms Reported

- Tinnitus & Fullness
 - Most common associated symptoms reported among all patients
- Tinnitus
 - Second most common reported associated symptom reported

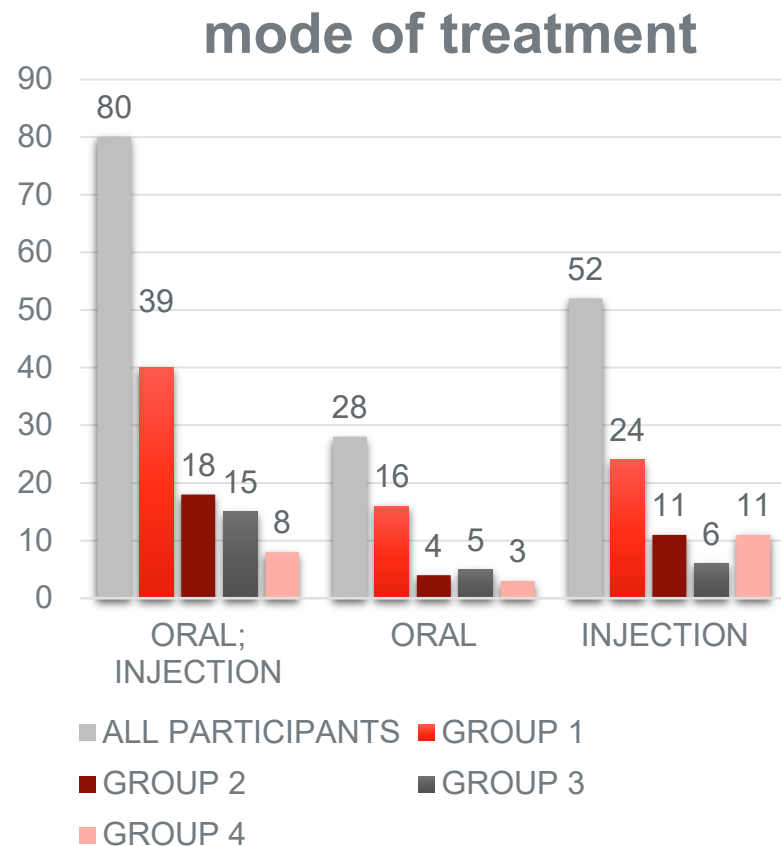
Additional Symptoms



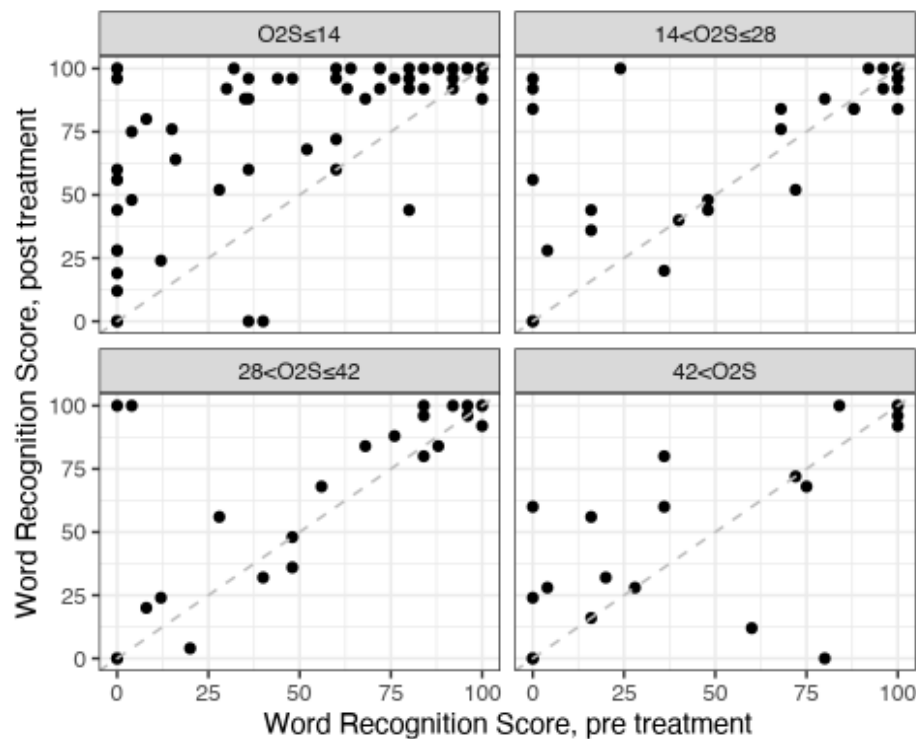
- None
- Fullness
- Fullness & Dizziness
- Tinnitus
- Tinnitus & Fullness
- Tinnitus, Fullness & Dizziness
- Tinnitus & Dizziness
- Dizziness

Mode of Treatment

- While mode of treatment held no statistical significance on anticipated recovery, a combination of oral steroid and intratympanic injection was prescribed by the treating physician: this is true for the overall sample size but across each group as well: N=160
- These findings are in agreement with existing literature.



Post treatment WRS



- WRS improvement was identified in all participants. This was especially true and identified in those seeking treatment beyond clinical guidelines set by the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNSF) (>6 weeks of onset) suggesting improvement in hearing acuity may present in other essential areas tested, not just PTA recovery.

WRS Improvement Implications

Treatment Implications

- Study findings are in line with literature in that prognosis is poor the further out from symptom onset an individual is.
- However, there is a possibility WRS can improve despite stable/ no change in PTA.
- Improvement in WRS was identified in individuals treated beyond the clinical recommendations.

Rehabilitative Implications

- WRS holds more weight on true hearing aid candidacy and realistic expectations.
- They serve as a guide for audiologists in determining appropriate rehabilitative recommendations
- A poor final WRS at the time of treatment discharge may alter appropriate options from binaural amplification (least invasive) to surgical options (most invasive).

Case sample 1

Date of testing: 9/13/2016

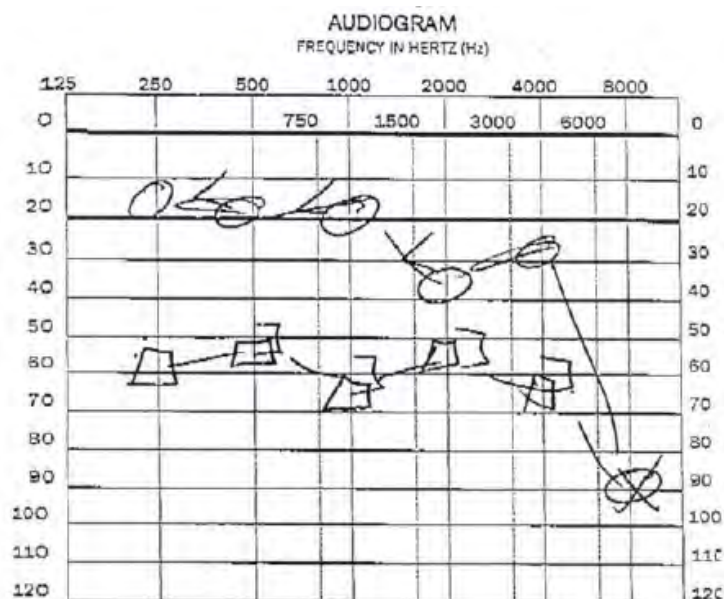
Sudden HL- Left ear which occurred in August of 2016

Associated symptoms: tinnitus, dizziness

Treatment: oral steroids initially

Imaging: MRI- unremarkable

Results: AS: Moderate-profound sensorineural hearing loss with 0 % WRS, speech discrimination thresholds are not documented– speech detection thresholds obtained at 40 dB HL.



SPEECH TESTING				
	RIGHT		LEFT	
SRT	35	Mask		Mask
SAT		Mask	40	Mask
DISCRIMINATION SCORE	100 %			%

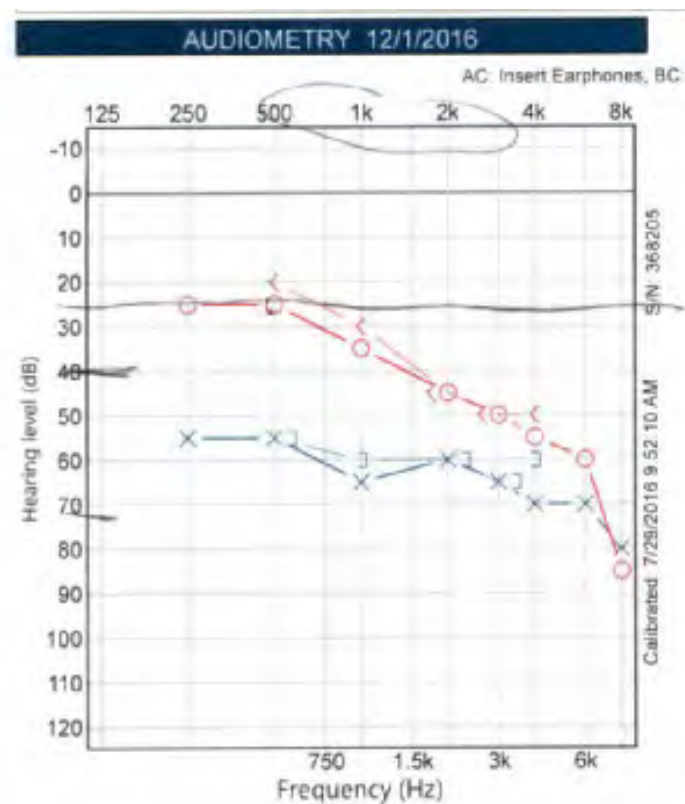
TYMPANOMETRY			
	TYPE	ACOUSTIC REFLEX	EAR CANAL VOLUME
RIGHT	A	-	1.0
LEFT	A	-	2.2

TYPE A: normal middle ear function
 TYPE As: reduced ossicular chain mobility
 TYPE Ad: ossicular discontinuity
 TYPE B: non-compliant ear drum
 TYPE C: negative middle ear pressure

OTOACOUSTIC EMISSION (OAE) TEST RESULTS
 Name: _____ Ear: LEFT Result: REFER

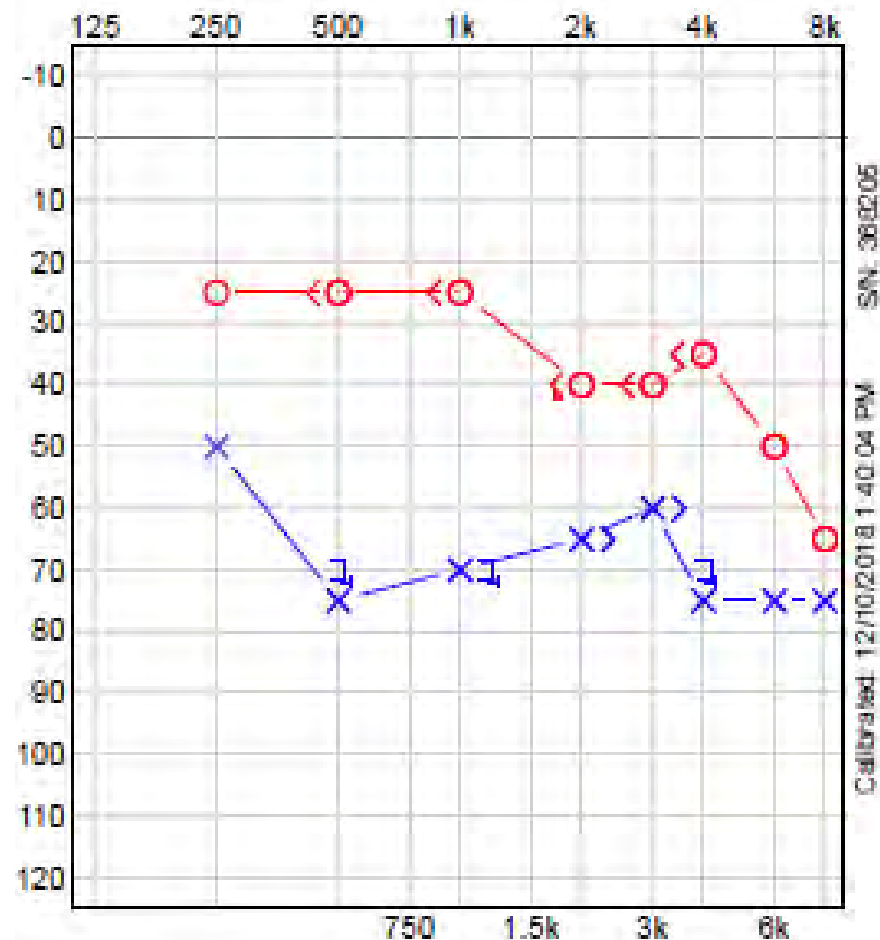
Case sample 1

- Thresholds: stable, unchanged
- WRS IMPROVED
- On 12/1/2016, WRS was able to be obtained and measured at 60%



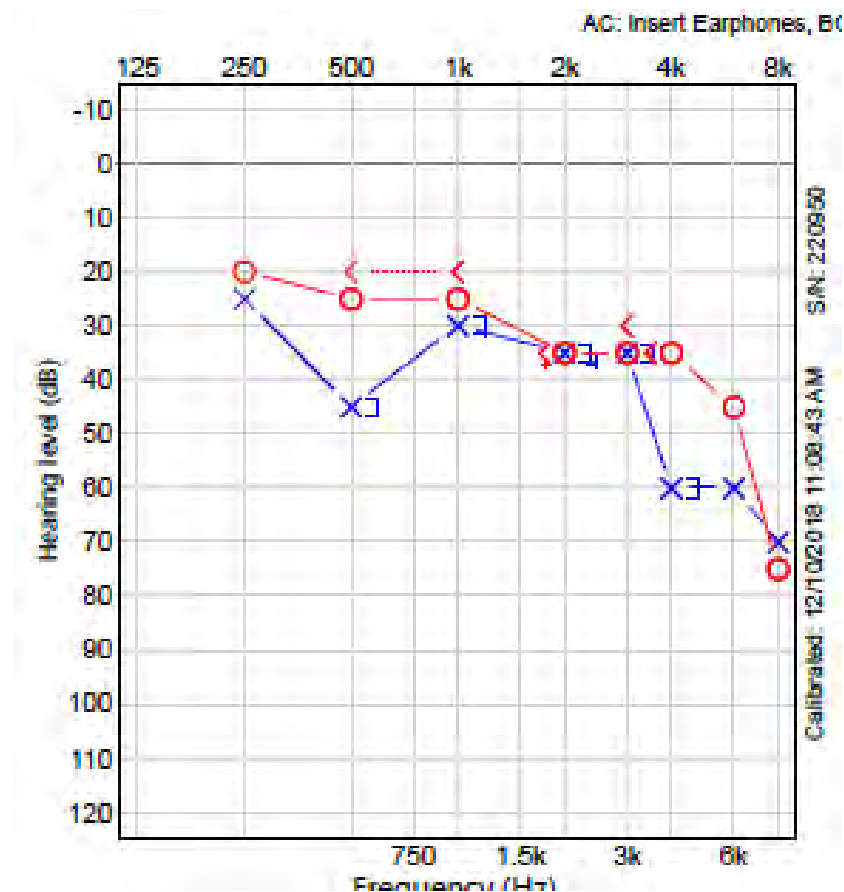
Case sample 2

- Date seen: 12/11/2018
- Ear: Left
 - Moderate to severe SNHL
- SRT and WRS: CNT
- Associated symptoms: tinnitus
- MRI: unremarkable
- Treatment: intra-tympanic injection x2



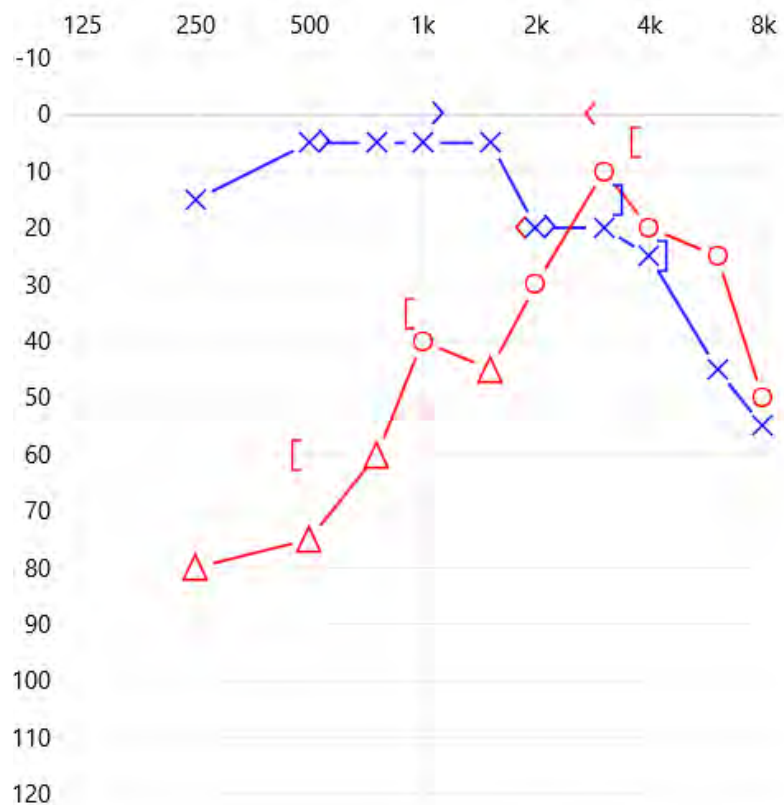
Case sample 2

- Test date: 4/2/2019
- Thresholds: Stable
- WRS, AS- 96%



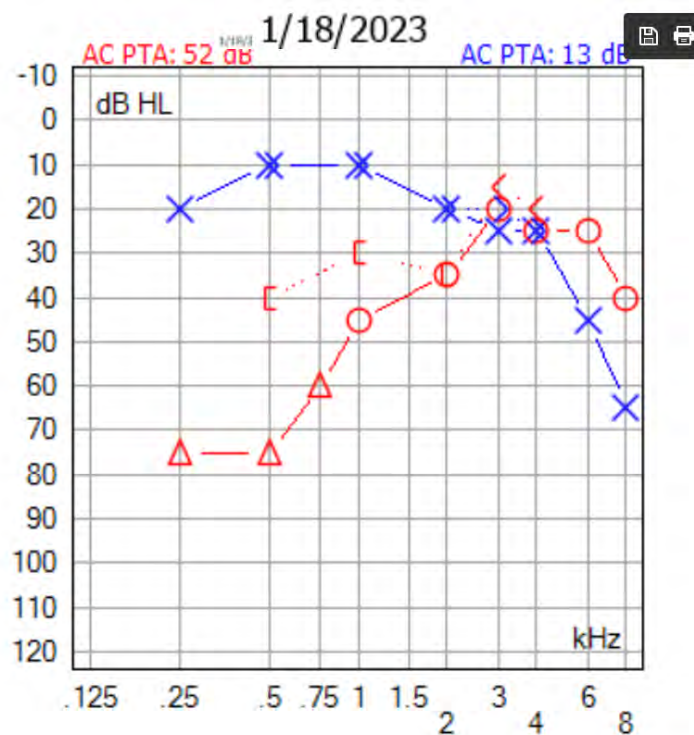
Case sample 3

- The study findings hold true even now, in 2023 with our patient population.
- To the right is the most recent audiologic result from a patient who experienced SSNHL- no cause identified.

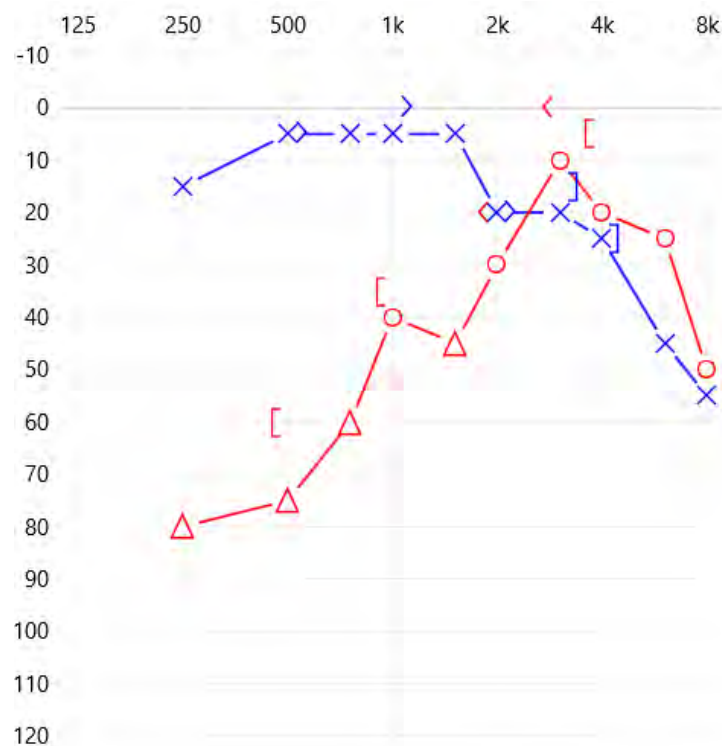


Case sample 3

1/18/2023



5/15/2023



Learning Objective 3



- Describe how to apply evidence based research to recovery anticipation in collaboration with otolaryngologists/otologists of patients seeking evaluation and treatment for idiopathic sudden sensorineural hearing loss.

Thank you

Irina Linkov Middleton, AuD, CCC-A



References

- Bulğurcu, S., Şahin, B., Akgül, G., Arslan, İ. B. & Çukurova, İ. (2018). The effects of prognostic factors in idiopathic sudden hearing loss. *International Archives of Otorhinolaryngology*, 22(1), 33–37. <https://doi.org/10.1055/s-0037-1603108>
- Chandrasekhar, S. S., Tsai Do, B. S., Schwartz, S. R., Bontempo, L. J., Faucett, E. A., Finestone, S. A., Hollingsworth, D. B., Kelley, D. M., Kmucha, S. T., Moonis, G., Poling, G. L., Roberts, J. K., Stachler, R. J., Zeitler, D. M., Corrigan, M. D., Nnacheta, L. C. & Satterfield, L. (2019). Clinical practice guideline: sudden hearing loss (update). *Otolaryngology--Head and Neck Surgery*, 161(1_suppl), S1–S45. <https://doi.org/10.1177/0194599819859885>
- Chandrasekhar, S. S., Tsai Do, B. S., Schwartz, S. R., Bontempo, L. J., Faucett, E. A., Finestone, S. A., Hollingsworth, D. B., Kelley, D. M., Kmucha, S. T., Moonis, G., Poling, G. L., Roberts, J. K., Stachler, R. J., Zeitler, D. M., Corrigan, M. D., Nnacheta, L. C., Satterfield, L. & Monjur, T. M. (2019). Clinical practice guideline: sudden hearing loss (update) executive summary. *Otolaryngology--Head and Neck Surgery*, 161(2), 195–210. <https://doi.org/10.1177/0194599819859883>
- Cvorović, L., Deric, D., Probst, R. & Hegemann, S. (2008). Prognostic model for predicting hearing recovery in idiopathic sudden sensorineural hearing loss. *Otology & Neurotology*, 29(4), 464–469. <https://doi.org/10.1097/MAO.0b013e31816fdbcb4>
- Davis, A., McMahon, C. M., Pichora-Fuller, K. M., Russ, S., Lin, F., Olusanya, B. O., Chadha, S. & Tremblay, K. L. (2016). Aging and Hearing Health: The Life-course Approach. *The Gerontologist*, 56 Suppl 2(Suppl 2), S256-67. <https://doi.org/10.1093/geront/gnw033>
- Edizer, D. T., Çelebi, Ö., Hamit, B., Baki, A. & Yiğit, Ö. (2015). Recovery of idiopathic sudden sensorineural hearing loss. *The Journal of International Advanced Otology*, 11(2), 122–126. <https://doi.org/10.5152/iao.2015.1227>
- Enache, R. & Sarafoleanu, C. (2008). Prognostic factors in sudden hearing loss. *Journal of Medicine and Life*, 1(3), 343–347.
- Europe, P. M. C. (n.d.). Europe PMC.
- Ganesan, P., Kothandaraman, P. P., Swapna, S. & Manchaiah, V. (2017). A Retrospective Study of the Clinical Characteristics and Post-treatment Hearing Outcome in Idiopathic Sudden Sensorineural Hearing Loss. *Audiology Research*, 7(1), 168. <https://doi.org/10.4081/audiore.2017.168>
- Jan, T. A., Kozin, E. D., Kanumuri, V. V., Sethi, R. K. & Jung, D. H. (2016). Improvement in word recognition following treatment failure for sudden sensorineural hearing loss. *World Journal of Otorhinolaryngology - Head and Neck Surgery*, 2(3), 168–174. <https://doi.org/10.1016/j.wjorl.2016.06.002>
- Moskowitz, D., Lee, K. J. & Smith, H. W. (1984). Steroid use in idiopathic sudden sensorineural hearing loss. *The Laryngoscope*, 94(5 Pt 1), 664–666. <https://doi.org/10.1288/00005537-198405000-00016>
- O'Connell, B. P., Hunter, J. B. & Haynes, D. S. (2016). Current concepts in the management of idiopathic sudden sensorineural hearing loss. *Current Opinion in Otolaryngology & Head and Neck Surgery*, 24(5), 413–419. <https://doi.org/10.1097/MOO.0000000000000289>
- Rauch, S. D. (2008). Clinical practice. Idiopathic sudden sensorineural hearing loss. *The New England Journal of Medicine*, 359(8), 833–840. <https://doi.org/10.1056/NEJMcp0802129>
- Toroslu, T., Erdoğan, H., Çağlar, Ö., Güçlü, O. & Dereköy, F. S. (2018). Comparison of different treatment methods for idiopathic sudden sensorineural hearing loss. *Turkish Archives of Otorhinolaryngology*, 56(4), 226–232. <https://doi.org/10.5152/tao.2017.2337>